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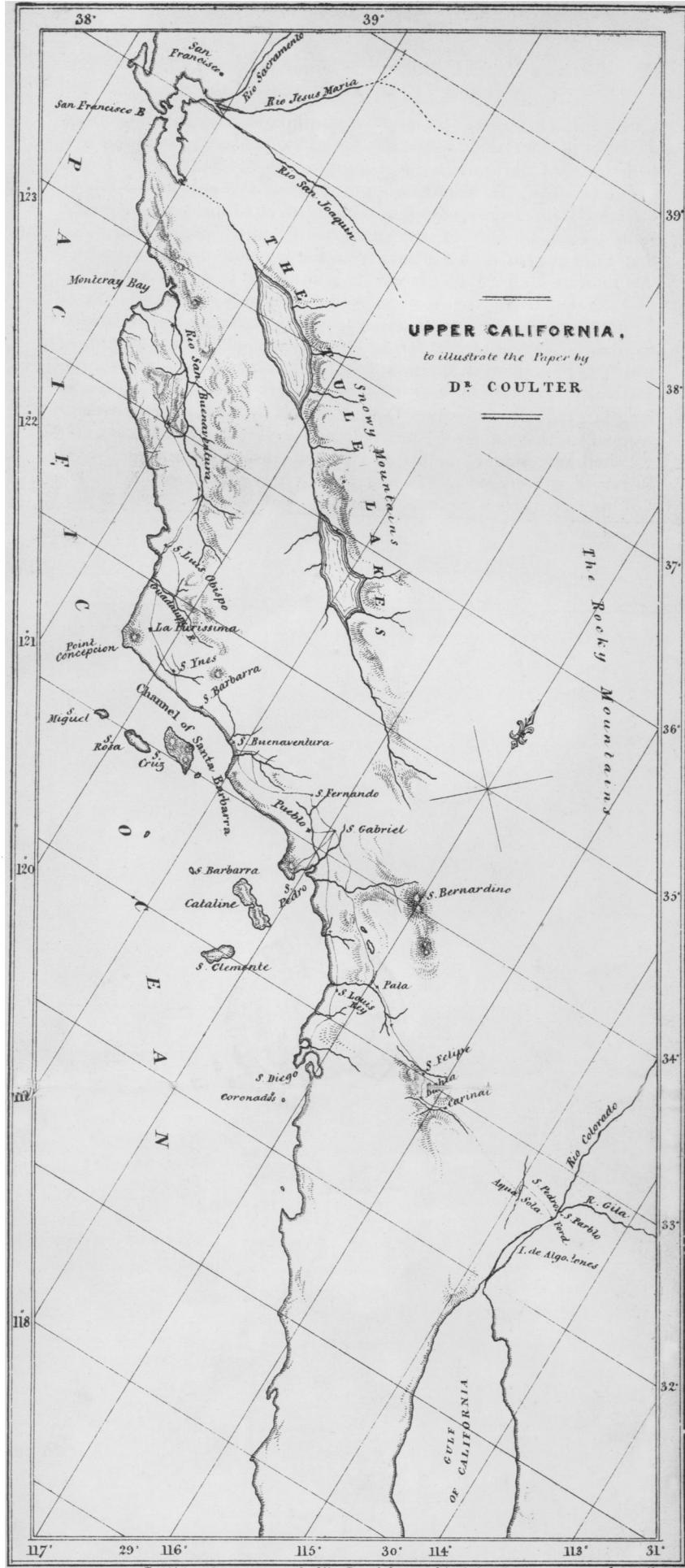
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IV.—*Notes on Upper California.* Communicated by Dr. Thomas Coulter. Read 9th March, 1835.

UPPER CALIFORNIA is usually considered as extending from the coast of the Pacific to the Rio Colorado, and from the boundary with Lower California, a few leagues south of San Diego, to the parallel of  $42\frac{1}{2}^{\circ}$  N., which is supposed to run through the middle of the lake Timpanogos (though, with respect to this latter circumstance, I am by no means satisfied, being much inclined to think that Timpanogos, which I believe to be the same as that called by the hunters Black Lake, is wholly within the Mexican territory). But the course of the Rio Colorado is entirely within the Rocky Mountains, which are separated from the inhabited, and indeed habitable, portion of California by a great sand plain, destitute of water. This plain is about 100 miles in breadth at its southern extremity, and about 200 at the northern; about 700 miles in length, gradually ascending toward the north, and similar in every respect to that on the eastern side of the Rocky Mountains; and we shall have a much better idea of the country by considering it therefore as bounded to the eastward by this plain.

Our view is thus confined, then, to a narrow tract of country of very remarkable features, the general run of its mountain-ridges, continuous with the chain of Lower California, being nearly parallel with the coast, and almost all the minor streams running north-westerly. Of the great rivers falling into the Bay of San Francisco, through the Boca de Carquinas, the Sacramento only has a southern course. The Jesus Maria and the San Joaquin run westerly or north-westerly, as do all the others collected in the Tule Lakes before entering the bay.

This view of the country is somewhat different from that usually entertained, and I am sorry that I am not able to speak to the whole of it on my own authority, not having been to the north of San Francisco, nor east of the Tule Lakes. It is necessary here, however, to notice the great popular error respecting these lakes. The great object of the earlier Spanish expeditions, under Columbus and his immediate followers, was not the discovery of a new continent, but of a western passage to the islands of the Pacific and to China; and even after a great extent of the coasts of America had been explored, the discovery of this passage continued to be a favourite object, everything that encouraged the hope of its attainment being greedily laid hold of. Hence the endless accounts of deep inlets and inland seas; and the extent to which the imagination was engaged in these may be judged of by the reception given to the fabulous story of a passage said to have been actually made from the north-west coast into Hudson's Bay. This anxiety, then, to find a passage from sea to sea, and the facility some of the earlier travellers



had in *creating* what they wished to find, where there was no immediate risk of detection, raised these comparatively insignificant ponds to the rank of a vast inland sea. The Tule Lakes are now known not to exceed 100 miles in total length, being fordable in the dry season in several places; and notwithstanding their many tributaries from the eastward, they discharge, during a considerable portion of the year, very little, if any, water into San Francisco. It is only immediately after the rainy season, which is usually ended by February, and during the thaw of the snow on the high range of hills between the lakes and great sand plain, that there is any considerable discharge of water from them in this direction. Such at least is the account given by the American hunters. A severe accident prevented my crossing this ground myself in company with a party of beaver-trappers; but I afterwards met with their chief, a very intelligent man, from whose account, compared with that of one of the missionary priests who had visited the Gentile Indians (*gentiles*) on the borders of the lakes, I have ventured to lay them down; and though there must of course be still some uncertainty respecting them, I hope further observation, whilst it must correct, will confirm the general view I have taken of the country. Limited, as I have supposed, to the eastward by the sand plain, the general form of the country is somewhat triangular, the ridge of mountains from Lower California dividing into several others, which slightly diverge as they advance northward. The great snowy peak of San Bernardino, east of San Gabriel, being the point from which the two principal ranges start; the one, the great snowy chain, separates the sand plain from the Tule Lakes; and the other separates the Tule Lakes from the seabord, not running farther north than San Francisco. Several minor ridges extend between this latter and the coast, of which the principal is that running from Monterey towards Santa Barbara, separating the Rio San Buenaventura, or the Monterey River, from the coast, and uniting with the Tule chain about Santa Ynes. The islands of the Channel of Santa Barbara also seem like the summits of a submarine chain, having its general direction parallel to the others.

It will not be necessary to enter, at present, into much detail of my journeys in the country, of which the principal was that from Monterey to the junction of the Rios Colorado and Gila; but I think it requisite to state the means used for determining the positions laid down in longitude. I had a transit in Monterey; but though set up there, the weather was too unfavourable to allow me to depend much upon the results; which, however, is of the less consequence, as that point has been carefully laid down by Captain Beechey. I have, therefore, assumed the longitude of Monterey as he gives it, and taken departures from it eastward by chronometer.

The only point at which I thought it necessary to take lunar distances was the ford on the Rio Colorado, six miles below its junction with the Gila, and that only as a check on my chronometer; for having been then reduced to one serviceable one, I felt it proper to take some precaution lest any accident should happen to it on my return, and so deprive me of the advantage of the returning set of observations for time. I however got it safely back to Monterey, and as I found the differences of meridian made going and returning, as shown by the chronometer only, to correspond very closely, I trusted to it *solely*.

I am the more disposed to insist particularly upon this point, because doubts have been expressed of the possibility of using a chronometer on shore, from the difficulty of transporting it safely, particularly on horseback. I am satisfied, from repeated trials, that this difficulty is not so great as has been imagined. All that appears to be necessary, is to carry the chronometer belted tight against the abdomen, and wear it so day and night. The march of that carried on this voyage affords one proof out of several I could state of what can in this way be accomplished, even under very unfavourable circumstances. The subjoined tables show the rate it kept, and the mode adopted of checking it at different points of the journey. It will be seen by these that time was taken, both going and returning, at several points, and that, had any derangement occurred, it must have been detected.

*Observations in the order of their dates.*

			m.	s.
Jan. 22.	Monterey.	Chron. by M. T.	+ 22	45.6
Feb. 22.	"	"	+ 18	54.3
Mar. 20.	"	"	+ 16	06.9
April 6.	Santa Barbara	"	+ 5	09.1
,, 23.	San Gabriel	"	- 2	54.5
,, 30.	La Pala	"	- 7	35.4
May 8.	Ford	"	- 17	48.8
,, 17.	"	"	- 18	59.7
,, 27.	La Pala	"	- 10	40.5
June 15.	San Gabriel	"	- 8	50.3
July 5.	Santa Barbara	"	- 4	39.8
,, 7.	"	"	- 4	54.9
,, 19.	Monterey	"	+ 2	33.4
Aug. 2.	"	"	+ 1	07.1

*Same observations arranged in sets for rate.*

Monterey.	Jan. 22.	Chr. by M. T.	m.	s.		
					m.	s.
	Feb. 22.	"	+ 18	53.4	Rate	- 7 5 daily.
"	March 20.	"	+ 16	06.9	" - 6 1 "	
"	July 19.	"	+ 2	33.4	" - 6 7 "	
"	Aug. 2.	"	+ 1	07.1	" - 6 16 "	

			m.	s.		
Santa Barbara.	Apr. 6.	Chr. by M. T. +	5	09.1		
„	July 5.	„	— 4	39.8	Rate —	6.56 daily.
„	7.	„	— 4	54.9	„	6.7 „
San Gabriel.	Apr. 23.	„	— 2	54.5		
„	June 15.	„	— 8	50.3	„	6.7 „
La Pala.	Apr. 30.	„	— 7	35.4		
„	May 27.	„	— 10	40.5	„	6.8 „
Ford, on Rio	May 8.	„	— 17	48.8		
Colorado.	„ 17.	„	— 18	59.7	„	7.88 „

*Results.*

		m.	s.	m.	s.
Monterey, to	diff. made going	= 28	24.4	mean	28 31.45
Ford	„ returning	= 28	38.5		
Monterey, to	diff. made going	= 8	59.4	mean	8 54.15
Santa Barbara	„ returning	= 8	48.9		
Santa Barbara,	diff. made going	= 6	19.1	mean	6 15.9
to San Gabriel	„ returning	= 6	12.7		
San Gabriel, to	diff. made going	= 13	15.5	mean	13 20.9
Ford	„ returning	= 13	26.3		

The sum of the three latter means (28<sup>m</sup> 31<sup>s</sup>.95) corresponding nearly with the result of the first taken singly.

Respecting these tables, there are two circumstances which require some little explanation. One is the change of rate to the amount of about one second daily during my stay at Rio Colorado, attributable perhaps to the excessive heat to which we were there subjected, the thermometer, exposed to the radiation of the plain only, standing frequently at 140° Fahr. (Further on there will be found some remarks on the causes of this very high temperature, so unusual in an extra-tropical latitude, with some other observations on the climate of Mexico which may be interesting to the reader.) Perhaps this degree of heat ought not to affect the chronometer; but I found it so intolerable, that I was obliged to leave off the belt in which I carried it, and to allow it to lie horizontally during my stay, which may also have contributed to produce the disturbance. The effect of this change is got entirely over by making account only of the time by chronometer at my arrival and again on my departing, leaving out of account the ten days during which I remained stationary.

The other circumstance deserving note is the difference observable in the easting and westing in some of the *divisions* of the journey, whilst there is none on the *whole*. This is not very great, and may be partly accounted for by the want of a barometer, which, from having frequently broken tubes before, I did not carry on this journey, which I was obliged to make very rapidly. I was consequently obliged to correct the refraction by guess. Whatever error there may have been in my guess would manifestly act

in opposite ways, going and returning, and its effect be got rid of by taking the mean of the results, the only evil being the discredit it appears to throw on the chronometer.\*

I have laid down the junction of the Rios Colorado and Gila nearly forty miles farther north than Lieutenant Hardy has done, and this also it is necessary to explain. This point, which was the site of the two missions of San Pedro and San Pablo, has long attracted a good deal of attention. Ever since the unsuccessful attempts of the Jesuits, particularly Padre Kino, to establish a communication over-land between Sonora and California, this point, near which is the best, and indeed usually the only practicable ford on the river below the junction, has been especially looked to. After Upper California was partially settled, the two missions above-mentioned were established, and at first thrived well; but in consequence of the removal of the commander in charge of them, in whom the Indians had great confidence, the neophytes rose, destroyed and abandoned the mission. The remains of that on the north side are still visible; it was built on a point of rock projecting a little into the river, and constituting the extreme southern point of the Rocky Mountains, towards which the river has gradually cut its way, leaving behind a broad plain now pretty well covered with poplar and brushwood. The junction of the two rivers is not a mile above this point, the Colorado coming south and the Gila nearly west.

When Lieutenant Hardy found himself on the point of the island of Algodones, forty miles south of this, nothing was more easy, unacquainted as he was with the country on either side, than that he should suppose himself at the junction of the two rivers. The two channels of the Colorado at this point run, with respect to each other, exactly as the two rivers do; and if he had known anything of the missions and the point of hill on which one of them was built, he had in view, on his north, a knoll, the only one in the plain, but very remarkable, and close to the river, which would much assist in leading him astray.

It would occupy too much time to go at present into any great detail of my travelling inland. I am tempted, however, to say a few words of the journey of which the principal observations are

\* I subjoin also a short table of the chronometrical measurements between Mexico and Zimapan, made in precisely similar circumstances. The chronometer was made by Crossthwaite (1361).

			<i>h.</i>	<i>m.</i>	<i>s.</i>
Zimapan, . . . April	8th, A.M.	8 h. Chr. by M. T.	1	8	40.7
"	15th, P.M.	4		1	6 31.3
Mexico,	22d, P.M.	4		1	6 43.2
"	29th, A.M.	7 $\frac{1}{2}$		1	5 10
R. D. Monte, May	1st, P.M.	3 $\frac{1}{2}$		1	6 32.2
"	14th, A.M.	8 $\frac{1}{2}$		1	3 4.3

given above, as it was the most interesting, the longest, and by far the most laborious of those I made in California.

The rainy season of 1832 ended late in February, which is rather after the usual time, and I started so soon as the country was passable, which it is not at all during the rains, nor for some time afterwards. The rivers, which in the dry season are mere beds of sand, are quite impassable when swollen; and even for some weeks after they have fallen low, the danger and difficulty of crossing some of them, on horseback, are very considerable. If these streams carried down only sand, they might be passed as soon as the rapidity of the current was so far abated that a horse could stand; but the sand comes down mixed with a vast quantity of mud, which settles together with it; so that even when the stream becomes so low that a small animal can walk across, a horse or a man cannot. It is not until the mud is gradually washed out of the surface of the deposit that this becomes possible. We have then a bed of hard sand resting upon one of semi-fluid mud and sand; and it is very difficult to say when and where it is safe to attempt the passage. On this occasion I had to pass the Guadalupe, in this state, between San Luis Obispo and La Purissima; and it was only after long search that I found a place where a bear had passed, and trusting to his sagacity I followed his steps. The stream was broad, very shallow, and the bed of clear sand on the surface of the deposit must have been very thin, for it swagged under foot like the surface of a quagmire. A body of troops which passed this way some days before, though on a most urgent affair, was obliged to wait for ten days to allow the sand to settle.

From Monterey southward the road runs through a series of narrow ravines, as far as San Luis Obispo; but about Santa Ynez, south of San Luis, and again in the neighbourhood of Santa Barbara, it runs on, or close by the beach; whence, southward, it keeps chiefly along the west foot of the mountains, separated from the sea by low sand-hills, in some places of considerable breadth, as at San Gabriel, where they are almost twelve leagues broad. The best way to the Colorado, in the dry season, is to follow the coast road as far as San Luis Rey, and thence ascend the Pala stream, which runs in a very narrow ravine behind the maritime ridge, crossing the summit level between its head and that of the small stream of San Felipe, which runs south-eastward till it reaches the border of the sand plain at Carizal, where it sinks; though its course across the plain, when swollen, which it rarely is, is marked by a dry channel, in many points of which a little water, usually very bad, is to be had by deep digging.

There is not much difficulty in any part of the journey up to this point,—the Carizal; but from hence across the plain, which is here about one hundred miles broad, and totally destitute of

pasture, cattle suffer extremely. It is always possible to carry water enough for a party of men ; but horses and mules must pass the first two days absolutely without water or food,—and even then get only brine at the point called the *Aqua Sola*, from its being the only pond on the plain. When I passed, the water I found at this place was so strong that it purged both men and cattle. There is here some rush and reed which mules will eat, though horses usually refuse them.

From hence there is still another day's journey to the *Rio Colorado*. After passing the river the same difficulties continue for seven days farther, on the *Sonora* road, as far as *Alta* ; but this part of the journey, from its greater length, it is extremely imprudent to attempt without a proper guide. The only water to be had is found in the ravines, frequently at some distance from the road, in excavations called *Tinajas*, made by the Indians, who were formerly much more numerous in this neighbourhood than they are at present.

The only settled portion of Upper California lies along the coast ; the missions being nearly all within one day's journey from it. The only point where a mission has any settlement farther inland is at *San Gabriel*, where the *Rancho of San Bernardino* is at the head of the valley, some thirty leagues from the port of *San Pedro*. This is indeed the only point of either *Californias*, south of *San Francisco*, capable of sustaining a large population. The valley is above thirty leagues long, and of considerable breadth to the westward, where it approaches the coast, and joins on either side the plain of *San Fernando* and *San Luis Rey*. It is in many places very fertile, and wheat, where it can be irrigated, yields better here than in any other part of the Mexican territories that I have seen. The vine also thrives better, and is beginning to be extensively cultivated. The mission alone has above a hundred and twenty thousand vines immediately about it ; and the inhabitants of the *Pueblo* have many fine vineyards. Here there is room for a great increase of population. The want of a safe port is indeed a great inconvenience ; but I have no doubt that it will be got over, and that we shall see the *Pueblo* rise rapidly to the rank of a considerable town. The anchorage of *San Pedro*, though very unsafe in bad weather, need be used but for the moment vessels are taking cargo on board or discharging ; and the time they are salting hides, or are otherwise detained, may be passed in perfect safety at the island of *Catalina*, in front ; which, besides two rather exposed anchorages to the east and south, with good water at this latter, has a very beautiful little bay on the west side, perfectly land-locked, where might be the salting-houses. The present government does not allow this, from fear of smuggling,

and not without some reason. San Diego, moreover, where the chief part of the salting is now performed, is not distant.

I have gone thus far into this subject because the general government is now making considerable efforts to colonise Upper California from Mexico, under the apprehension that, if not done, the North Americans will get in in too great numbers. This apprehension appears to be hardly rational, as the *tierras realengas*, or lands still at the disposal of the state, are in California, as they always have been in the Spanish colonies, given gratis, at the discretion of government, and not sold to the best bidder, as in the United States. Any efforts made for the purpose of colonising Upper California should be directed towards the portion of the country north and east of San Francisco and east of the Tule lakes, which is fertile, well wooded and watered, and of sufficient extent to make its colonisation worth while as a speculation; the rest of the country south of San Francisco and west of the Tule lakes, possessing, with the exception of the valley of San Gabriel, too little cultivable ground, and of this a very small portion irrigable—the soil, however, where it is arable, being usually rich. Wheat, the vine, and all fruit trees that have been tried, thrive remarkably well, though the mildew near the coast, about Monterey, frequently hurts the wheat; and the chapul, or locust, by which name a great variety of grasshoppers is known, often destroys the vine, and indeed everything else. A mild winter is sure to be followed by this pest, particularly south of Santa Barbara. They appear to breed along the coast in the sand-hills; and as the north-westerly winds prevail, they are carried inland, and destroy everything they meet.

The great article of produce in Upper California is black-cattle, and their increase has been really prodigious. It is not yet seventy years since their first introduction, to the number of twenty-three head. In 1827 the missions possessed 210,000 branded cattle, and it was supposed not less than 100,000 unbranded. It is found necessary to slaughter not less than 60,000 annually, to keep the stock down to its present standard, which it is supposed it could not much exceed with advantage, until more of the country to the eastward shall have been settled. The young cows usually bear a calf before they are two years old, which, with the rule usually observed not to kill a cow capable of bearing, will account for their rapid increase. Sheep have increased nearly as rapidly, but are as yet of little interest to the trade of the country. I have not heard of any export of wool from California. Sheep are rarely slaughtered for consumption, as their price has been kept up by the priests, either without any definite motive, or what is, I fear, more near the truth, from some mistaken calculation. It is sufficiently strange that where the fattest bullock is worth only eight

dollars, and can rarely be sold at all, and where young cows in calf can be bought in droves at about two dollars, and frequently less, a sheep cannot be bought for less than three dollars. This state of things of course cannot last long. The destruction of the missions now in progress will throw into the market a stock of about 200,000 head, which of course must soon fall to its proper value.

The number of the white inhabitants has also increased very rapidly, and I believe is now not under six thousand, though I cannot state their numbers very exactly until I shall have examined the statistical materials which I have collected.

The reverse, however, is the case with the aboriginal inhabitants. They have diminished considerably in number, though, in this case, one would suppose they ought at least not to have lost ground, not having been driven from their homes, as in the United States, nor having had ardent spirits at all within their reach until lately. But they have been compelled to live under a restraint they could not bear, and to labour a little—neither of which they would submit to if they could possibly avoid it. Though the fact is as far as possible dissembled, I believe that a great deal both of force and fraud were used in congregating them together in missions ; and the moment that force shall be altogether withdrawn, I have no doubt that the majority of them will return to the woods. Now that the seabord is pretty much occupied by whites, the Indians will probably retire to their relations still living free in the interior.

It is a very extraordinary fact that their decrease is greatly hastened by the failure of female offspring,—or the much greater number of deaths amongst the females in early youth than among the males,—I have not been able clearly to determine which, though the latter appears the more probable ; the fact, however, of there being a much smaller number of women living than of men, is certain. Infanticide, properly so called, is not common, though very frequent recourse is had to the means of producing abortion, chiefly mechanically ; but this will not account for the state of things described, as males and females must be supposed in this way to suffer equally. All the missions of Lower California have perished or are perishing from this cause, or at least with this accompanying circumstance ; and in Upper California, in almost all the missions, a great many of the men cannot find wives. The mission of San Luis Rey is the only remarkable exception. In it the Indians are stated to be upon the increase, and the women in numbers equal to the men ; but my acquaintance with this mission is too limited to enable me to speak of the causes of their momentary escape from what appears to be the inevitable fate of their race in the neighbourhood of white men—a fate from which I fear the Luisenos are not likely to escape. The political

reforms now in active operation in California, and of which the first and most important measure is the destruction of the missions, will enable the white inhabitants to acquire possession of the great bulk of the mission lands ; and though agreeably to the spirit of the Spanish laws, which certainly were meant to afford the Indians a degree of protection unknown in our old colonies, they may for a long time retain a portion of their ancient possessions, it is but too probable that the combination of their own vices to which they cling, with those of their intruding neighbours, which they very easily acquire, will ensure the ultimate annihilation of a race which exhibits so few traces of moral energy.

I shall not at present go into any examination of the vegetation of California, though this, as well as its Fauna, is well worthy of the most attentive consideration. But I am tempted to make a few observations on some circumstances in the general aspect of the country, which appear sufficiently striking. The accompanying map, though very rude, and in many respects certainly not very correct, will serve at least to show that we must consider the whole of the two Californias as one great chain of mountains, with several long but usually narrow valleys dividing it into ridges nearly parallel with the coast, and as a whole, separated by the gulf of Cortez and the great sand-plain, from Sonora and the Rocky Mountains ; with which latter, however, the Californian chain appears ultimately to unite north of the parallel of  $42^{\circ}$ , about the great summit-level dividing the waters of the Columbia from those falling into the bay of San Francisco. The neighbourhood of this bay is the only part of the country likely ever to become of much interest to Europeans. It is highly fertile, well wooded, watered, and perfectly healthy. The Sacramento is navigable to a considerable distance, and runs through a country capable of sustaining an immense population. Even the Tule lakes, though navigable for steam-boats only when flooded, will then afford the means of transport for timber, hides, and other produce, from a considerable and valuable tract of country.

Lower California is pretty rich in minerals. I have seen very rich argentiferous lead ores from the southern extremity of it, and gold is also found in several places. But in Upper California, I know of no place where either has been found, except to the eastward of Santa Ynez, where a small silver mine was successfully wrought for some time, till the owners were killed by the Indians ; and in one of the streams falling into the southern Tule lake some gold has also been found by the beaver hunters, but as yet in very small quantity.

I shall conclude this paper with a few remarks upon the climate of Mexico. In an early part of my letter I stated that the thermometer had frequently stood at  $140^{\circ}$  Fahr. This, it is ne-

cessary to explain, was the temperature of the atmosphere a few feet above a plain excessively dry and heated by the sun; and something may also be due to the circumstance of the thermometer, although carefully screened from the sun, being exposed to the radiation of the soil, which was very great and frequently oppressive. This very high temperature is not, however, to be considered as of very frequent occurrence, but always owing to some local and temporary causes; one of which, and indeed a necessary condition for its attaining its greatest height, being that there should not be any wind. Such was the case during the latter three days of my stay at the ford on Red River. The wind, after having blown for many days from the S.W., suddenly lulled three days before my departure on my return, and continued dead calm for the first day of my journey, that is, until reaching Agua Sola. This was one of the most painful days I have spent, notwithstanding that the excessive dryness of the atmosphere necessarily exempted me from that oppression felt in damp situations even at very inferior temperatures. To this extreme dryness must also be attributed the occurrence of severe cold occasionally in the same situations.

The surface of the country, covered in almost its whole extent with bare mountains or sand plains, completely destitute of water, contributes nothing towards mitigating the cold of the winds blowing from the elevated portions of the Rocky Mountains to the N. and N.E. Hence, when these continue to blow for any length of time, it freezes even to the south of Pitis, in lat. N.  $29^{\circ}$ ; and in the winter of 1829-30, it froze in Pitis every night for nearly two months. On the 12th December, on arriving at San Jose, a few leagues from Pitis, I found the thermometer at  $18^{\circ}$  Fahr., at 8 h. P.M. On the 13th, it stood in the shade below  $32^{\circ}$  all the day, at night sinking even to  $18^{\circ}$ . This, however, appears to occur very rarely. I understood that for seventy-two years there had not been a frost severe enough to kill the mesquites (a species of acacias), which on this occasion suffered severely.

Though it is not exactly in point, I cannot avoid noting, that, on the table-lands of Mexico, similar cases of cold occur, with the difference of being more frequent, as may be easily conceived from its greater elevation, with the same condition as to the general scarcity of water. At Veta Grande, Zacatecas, during the month of December, 1825, it frequently froze hard. I subjoin some extracts from my journal.

		Max.	Min.
December 2	.	$53^{\circ}.5$	$20^{\circ}$
," 3	.	$48^{\circ}.5$	$18^{\circ}$
," 4	.	$34^{\circ}$	$18^{\circ}$
," 6	.	$59^{\circ}$	$41^{\circ}$
," 12	.	—	$12^{\circ}$

and so on through the remainder of that month and January ensuing.

This was not stated to be unusually severe. It is strange that the agars and many species of cactus should be able to resist this cold. They do not indeed thrive, but they live, only of course in consequence of the extreme dryness of the ground at that season.

A few years before, the water, trickling down the sides of the shaft of Concepcion, froze to the depth of seventy varas (thirty fathom). The shaft is in a very sheltered situation, but as its mouth is far below the level of the general drainage shaft, close by it, the cold air enters by Concepcion, and after circulating through the working, issues warmed through the tiro general as through a chimney.

The condition of countries situate as a portion of Sonora and California is, between the summer and the winter rains, is worthy of some consideration. Having seen only this one, I shall limit my observations to it.

The whole of the rain in Mexico may be said to fall in the summer months; occasional and usually slight showers fall in winter, but are pretty much limited to particular districts, as Xalapa, &c. In California Alta, on the contrary, it rains only in the winter, with a similar exception in favour of Monterey, where there are sometimes, but rarely, slight showers in summer. The summer rains reach the lower part of Sonora, where, however, they are scanty and irregular; and from Pitis, northward, across the sands, it rarely rains at all; as is also the case in the northern portions of Lower California, where the summer rains scarcely prevail to the north of Loretto, the capital.

I am sorry to be obliged to content myself with offering the Society so desultory and imperfect a sketch as this; but I have many claims on my time, the most urgent of which is the preparation of a work in some detail on the entire subject of California. Whatever is here defective will there, I hope, be found supplied.

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V.—*On the General Outline and Physical Configuration of the Bolivian Andes; with Observations on the Line of Perpetual Snow upon the Andes, between 15° and 20° South Latitude.* By J. B. Pentland, Esq. Communicated by Woodbine Parish, Esq. Read March 23, 1835.\*

BARON HUMBOLDT, in the interesting notes to the third volume of his “Relation Historique,” has so accurately sketched the general outline of the Peruvian Andes, situated between the four-

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\* This paper was written in 1830, and was intended as an introduction to a geological description of that part of the Andes of Peru.